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Fact Sheet

Disinfectants and Disinfection Byproducts

Stage 1 Rule

Background

Many water systems add chlorine or other disinfectants for treatment to destroy or inactivate microbial organisms. However, these disinfectants form disinfection byproducts (DBPs) when they react with naturally occurring organic substances in the water. Some disinfectants and DBPs cause cancer and reproductive effects in laboratory animals and may have bladder cancer and reproductive effects in humans. While there is no conclusive evidence that disinfectants or DBPs are associated with cancer or other health effects, the federal Environmental Protection Agency (EPA) issued the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) in 1998.

The purpose of Stage 1 DBPR is to improve public health protection by reducing exposure to disinfection byproducts (DBPs). The Washington State Department of Health incorporated the Stage 1 DBPR requirements into the drinking water regulations on April 27, 2003.

The Stage 1 DBPR establishes seven new standards and a treatment technique to further reduce DBP exposure. This rule applies to:

1) All community water systems and nontransient noncommunity (NTNC) water systems that continuously use chlorine, ozone, chloramines, or chlorine dioxide during any part of the treatment process.
2) Transient noncommunity (TNC) water systems that use chlorine dioxide.

The rule applies whether the chemical is used as a disinfectant or an oxidant.

Regulated Disinfectants

The Maximum Residual Disinfectant Levels (MRDL) for chlorine and chloramines is 4.0 mg/L as Cl_2. The MRDL for chlorine dioxide is 0.8 mg/L. Compliance with the MRDL for chlorine is based upon the running annual average (RAA) of residual measurements taken at the same time and place as routine or repeat coliform samples for 12 consecutive months. The RAA is calculated by finding the average of all included residual measurements for each month, adding 12 consecutive monthly averages together, and dividing the sum by 12. The RAA must be calculated at the end of each calendar quarter.

Regulated Disinfection Byproducts

The Stage 1DBPR regulates four DBPs. Since DBPs can continue to form as long as the organic substances and disinfectant are present, the highest concentrations are usually found at the farthest points of the system. The Maximum Contaminant Levels (MCL) and sampling requirements for DBPs are as follows:

Contaminant	MCL (mg/L)	Compliance
Total Trihalomethanes (TTHM)	0.080	RAA of Quarterly Averages
Five Haloacetic Acids (HAA5)	0.060	RAA of Quarterly Averages
Bromate	0.010	RAA of Monthly Averages
Chlorite	1.0	Daily

All community and NTNC systems using disinfectants must monitor for TTHMs and HAA5. Only systems using ozonation are required to monitor bromate. Systems that use chlorine dioxide must conduct daily chlorite monitoring. Bromate and chlorite must be monitored at the entry point to the distribution system. TTHM and HAA5 monitoring must be done according to the following table:

System Type	TTHM/HAA5 Samples	Location
Surface Water ≥ 10,000 persons	4/treatment plant/quarter	25% at maximum residence time Others at average residence time
Surface Water 500 - 9,999 persons	1/treatment plant/quarter	At maximum residence time
Groundwater ≥ 10,000 persons		
Surface Water < 500 persons	1/treatment plant/year in month of warmest water temperature	At maximum residence time
Groundwater < 10,000 persons		

All systems, except for surface water systems serving less than 500 persons, may qualify for a reduced monitoring schedule for TTHM & HAA5 if sample results meet certain criteria.

Disinfection Byproduct Precursors

Systems providing conventional (sedimentation with filtration) surface water treatment must collect one raw water Total Organic Carbon (TOC) sample and one treated water TOC sample each month for each treatment plant. These systems must meet specified TOC percent removal levels or meet alternative compliance criteria each month to meet treatment technique requirements.

Monitoring Plans

Every affected system must develop a system-specific monitoring plan to be available for inspection by DOH and the public by January 31, 2004. Surface water systems serving more than 3,300 persons must submit their plans to DOH. All other systems should keep the plan in their system records until DOH specifically requests it. If a system wishes to demonstrate that multiple wells (other than a designated well field) are drawing from the same aquifer, thereby reducing their required monitoring, they must submit their monitoring plan with the required report.

For more information

"Chlorination of Drinking Water," DOH pub. # 331-253

"Disinfection Byproducts," DOH pub. #331-251

"Alternate Disinfectants," DOH pub. #331-252